Achieving Agility at Scale
Improving Software Economics

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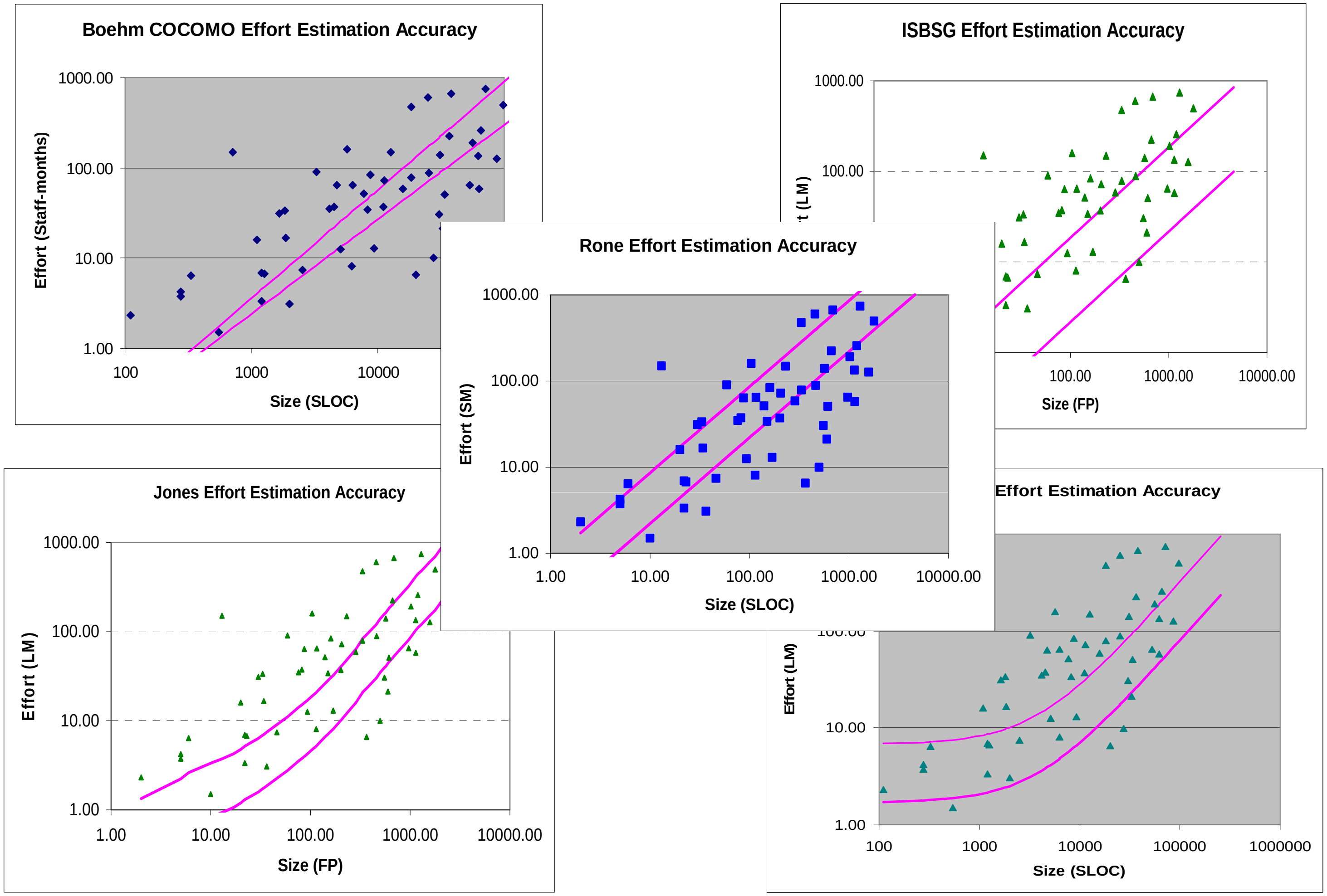
Software development obsolesced by software delivery

Software Development	Software Delivery
Distinct development phase	*Continuously evolving systems*
Distinct handoff to maintenance	*No distinct boundary between development and maintenance*
Requirements-design-code-test sequence	*Sequence of released capabilities with ever increasing value*
Phase and role specific tools	*Common platform of integrated process / tooling*
Collocated teams	*Distributed, web based collaboration*
Standard engineering governance	*Economic governance tailored to risk / reward profiles*
Engineering practitioner led	*Business value and outcome led*

Software cost models



From George Stark, Paul Oman, “A comparison of parametric Software Estimation Models using real project data”, in press

Improving software economics

- Empirical software cost estimation models for:
  - Enterprise modernization, software maintenance
  - New developments, new releases, early prototypes
  - Packaged applications, systems engineering

$$\text{Time or Cost To Build} = (\text{Complexity})^{(\text{Process})} * (\text{Team}) * (\text{Tools})$$

Complexity

- Volume of human generated stuff
  - KSLOC, FPs, UCs
- Quality/performance
- Scope

Process

- Methods
- Maturity
- Agility
- Precedence

Team

- Skills/Experience
- Collaboration
- Motivation

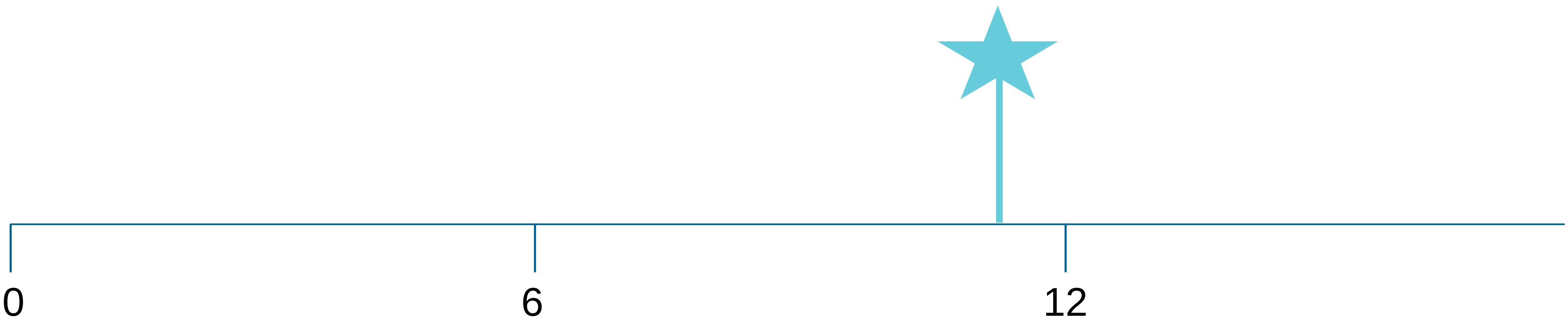
Tools

- Automation
- Process enactment

Schedule risk: Imagine you have 12 months to deliver a business critical system

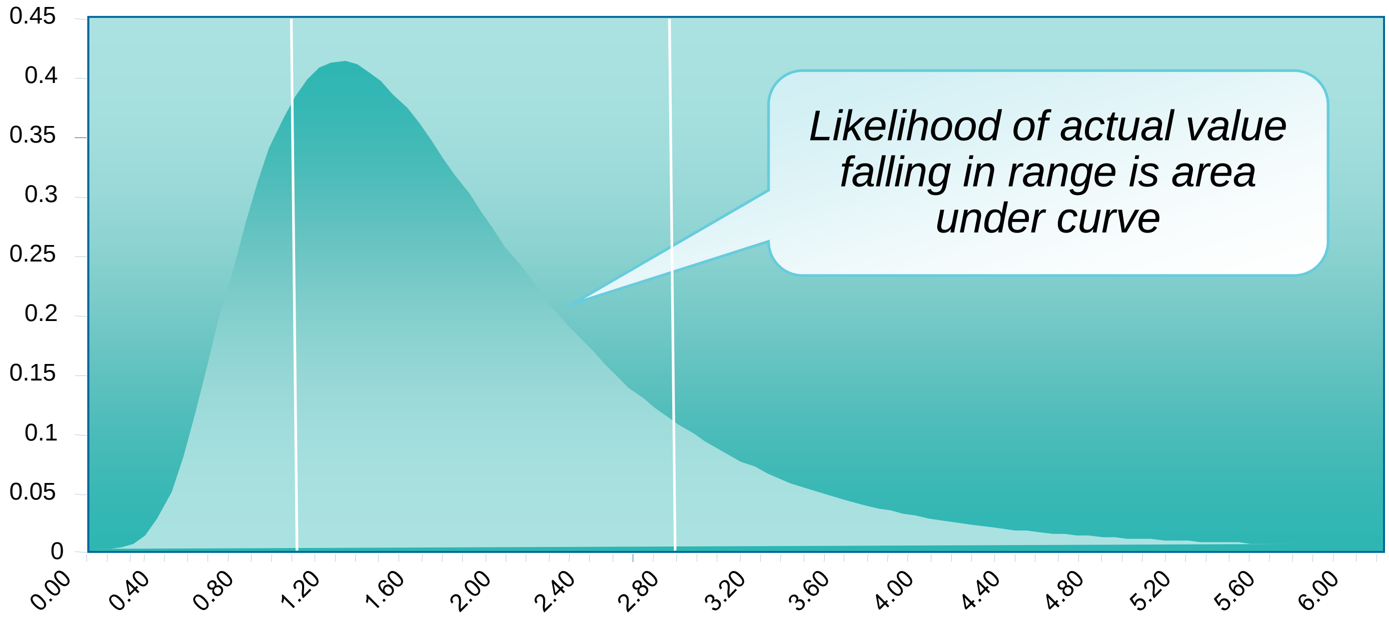
- Your estimators tell you it will be done in 11 months

- What do you do with the information?
  - Rest easy, believing there is no risk?



Maybe you realize that program parameters (cost, schedule, effort, quality, …) are random variables

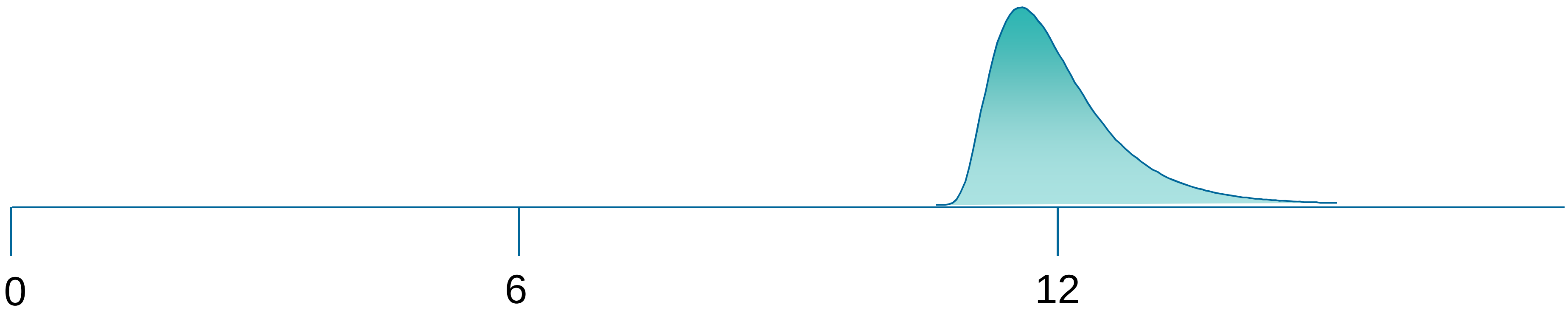
- Area under curve describes probability of measurement falling in range



Likelihood of actual value falling in range is area under curve

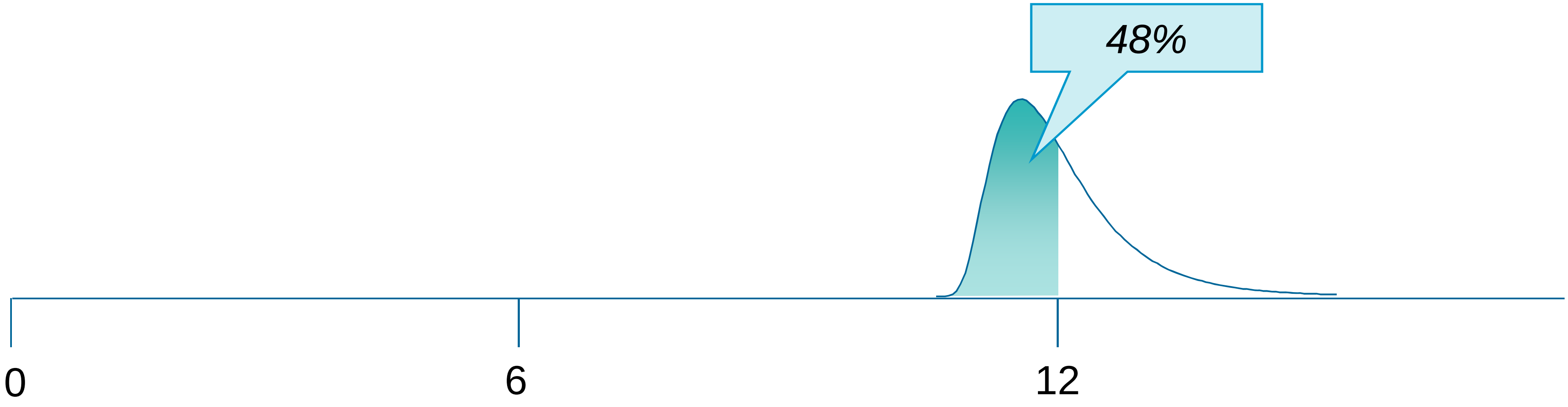
Imagine you have 12 months to deliver a business critical systems

- So you ask for the distribution and discover there is some uncertainty



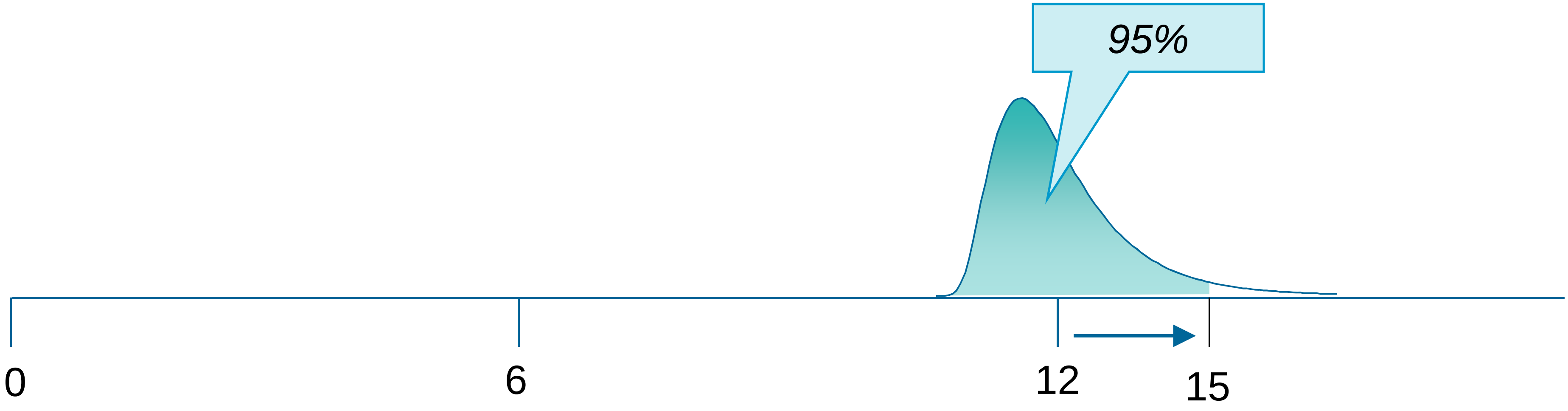
Imagine you have 12 months to deliver a business critical systems

- In fact there is less than 50% chance of making the date



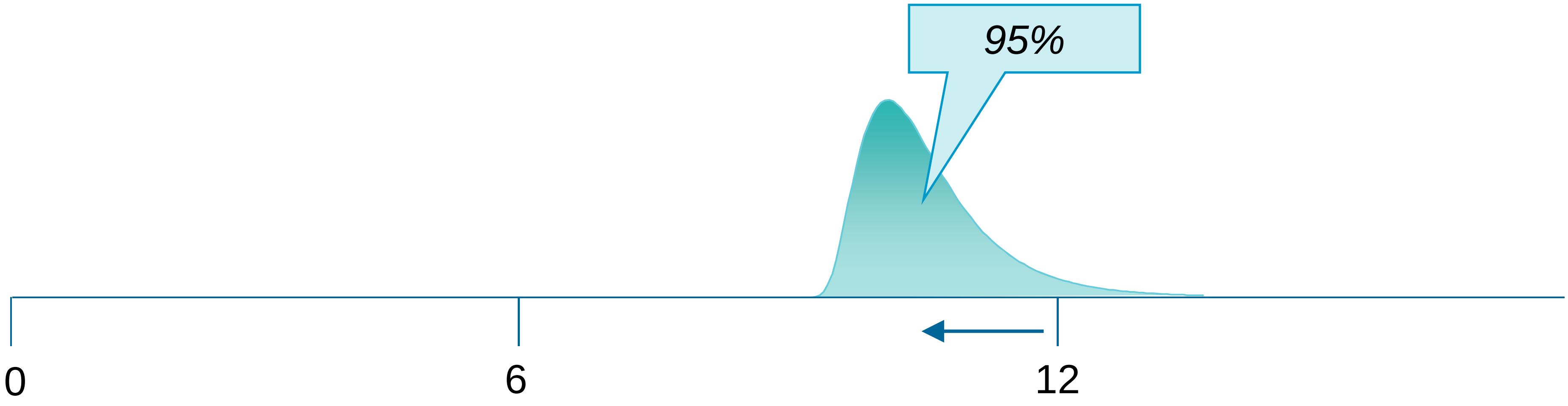
Then what?

- Move out the date to improve likelihood of shipping?



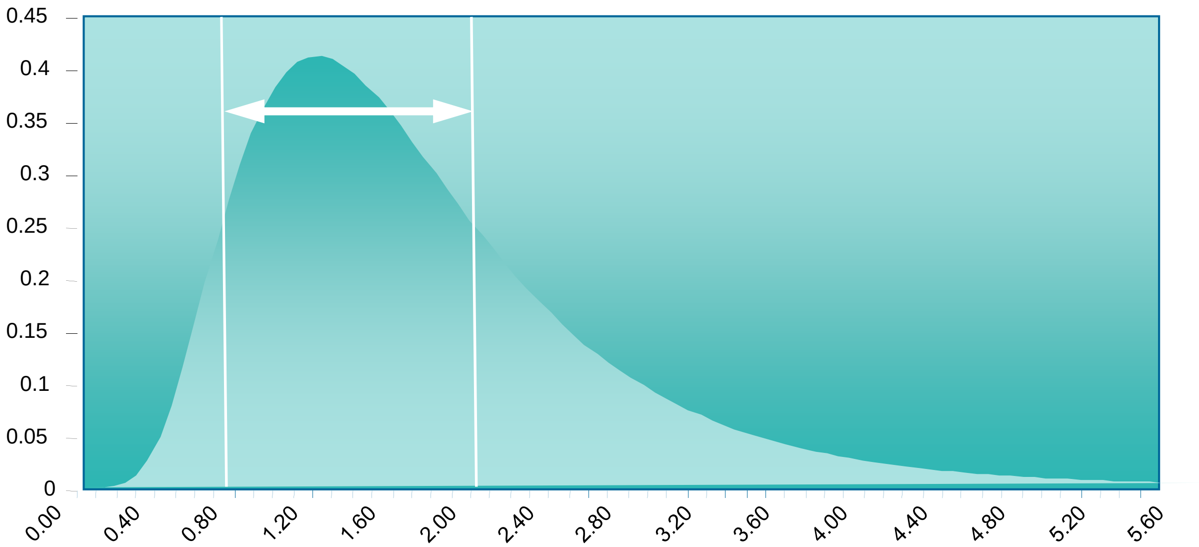
Then what?

- Or move in the estimate by sacrificing quality or content?



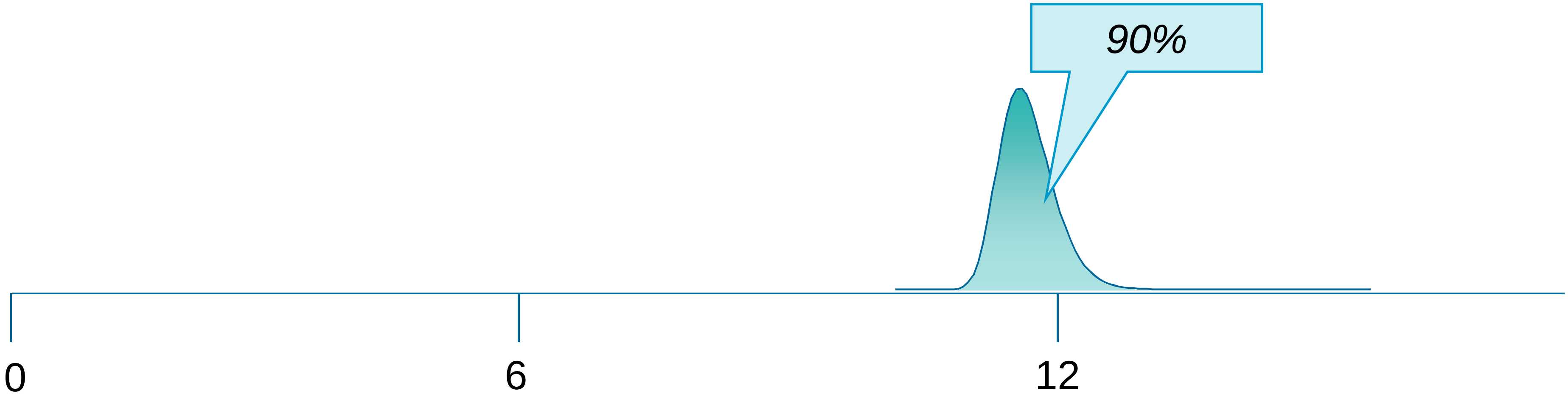
Managing variances in scope, solution, plans: The real key to improving software economics

- Sources of uncertainty and variance
  - Lack of knowledge
  - Lack of confidence
  - Lack of agreement
- Reduction of variance reflects
  - Increased predictability of outcome
  - Increased knowledge about
    - Client needs
    - Technology capability
    - Team capability
  - Good decisions



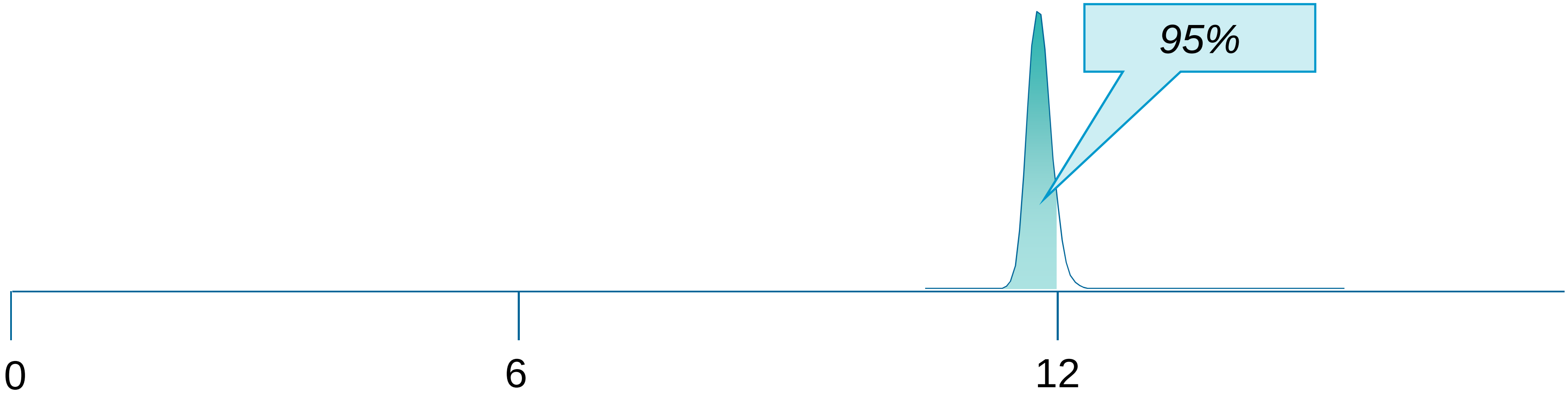
Then what?

- Determine the source of the variance
- Over the project lifecycle, reduce the variance to improve likelihood of shipping

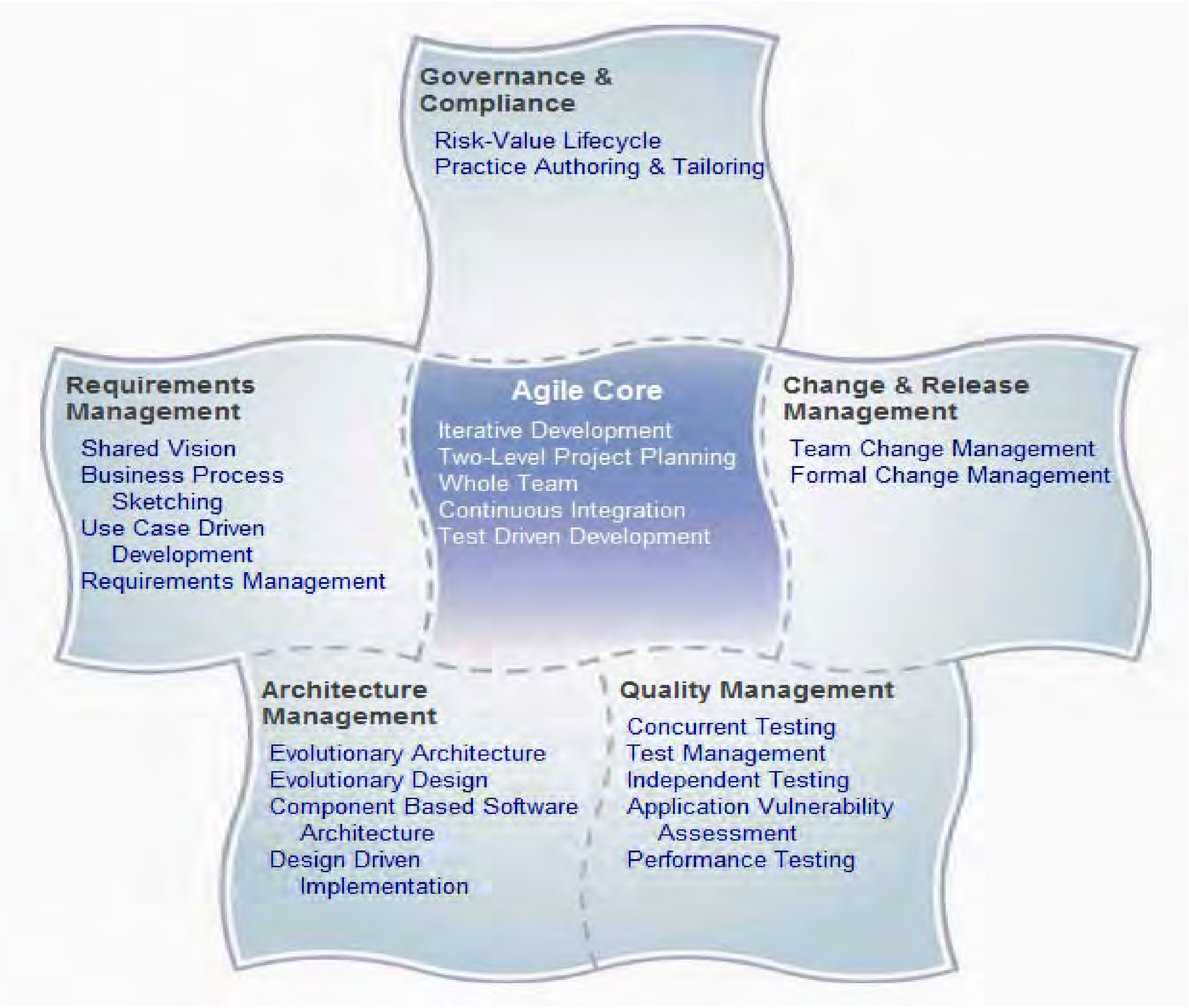


Then what?

- Over the lifecycle, reduce the variance further to improve likelihood of shipping



Practices included as part of Rational Method Composer



Governance & Compliance

- Risk-Value Lifecycle
- Practice Authoring & Tailoring

Requirements Management

- Shared Vision
- Business Process Sketching
- Use Case Driven Development
- Requirements Management

Agile Core

- Iterative Development
- Two-Level Project Planning
- Whole Team
- Continuous Integration
- Test Driven Development

Change & Release Management

- Team Change Management
- Formal Change Management

Architecture Management

- Evolutionary Architecture
- Evolutionary Design
- Component Based Software Architecture
- Design Driven Implementation

Quality Management

- Concurrent Testing
- Test Management
- Independent Testing
- Application Vulnerability Assessment
- Performance Testing

Critical culture shifts in improving software economics

Conventional Governance

Activity-based management
- Mature processes, PMI/PMBOK
- Plan in detail, then track variances

Adversarial relationships
- Paper exchange, speculation

Requirements first
- Assumes certainty in desired product
- Avoid change

Early false precision
- "More detail = higher quality"

Apply too much or too little process
- Process is primary, blind adherence

Agile Economic Governance

Results-based management
- More art than engineering
- Plan/steer/plan/steer…

Honest collaborative communication
- Progressions/digressions, facts

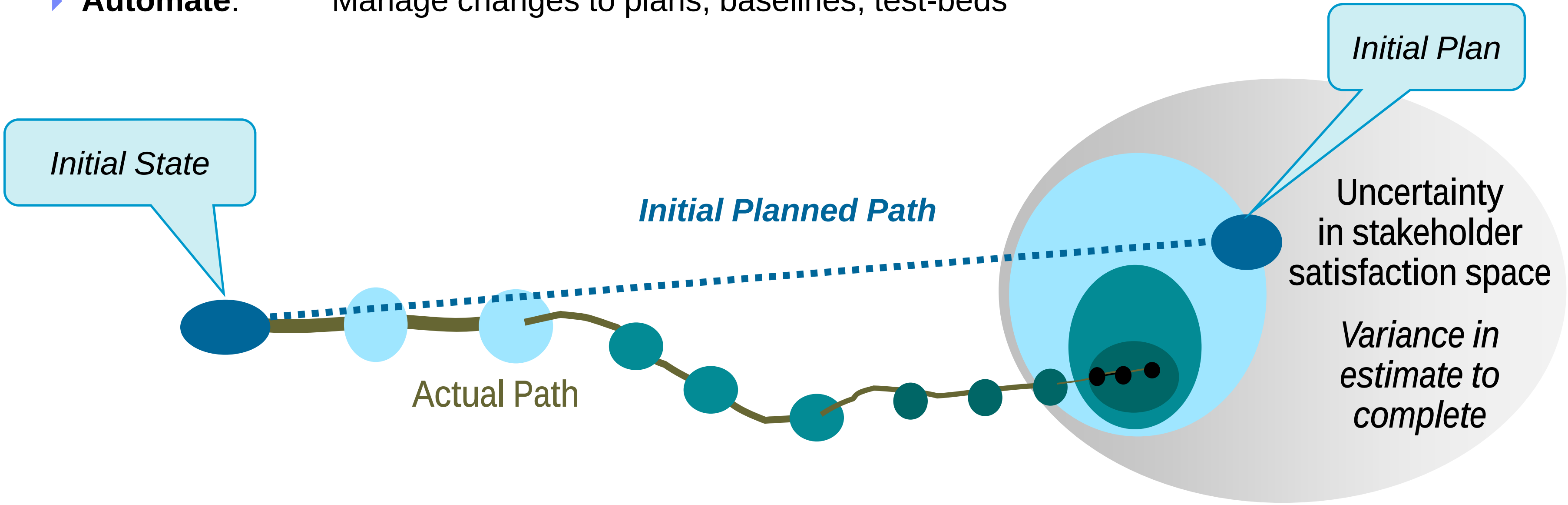
Architecture (*risk mitigation*) first
- Admits uncertainties
- Manage change

Evolving artifacts
- Scope (Problem specs)
- Design (Solution specs)
- Constraints (Planning specs)

Right-size the process
- Desired results drive process
- Manage variances

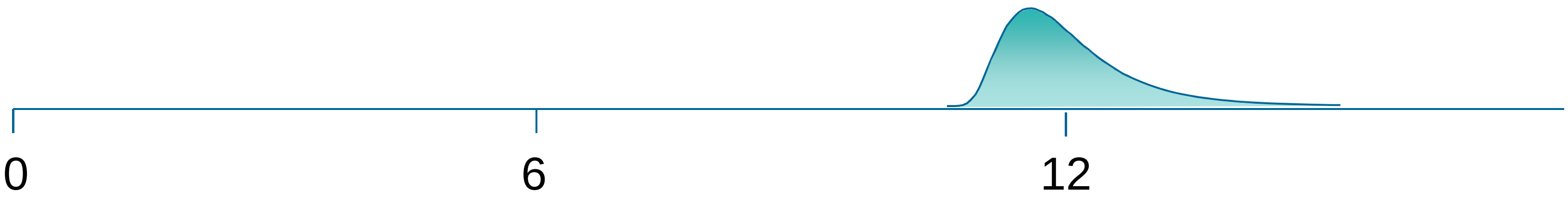
Measure and steer

- At onset of program
  - **Report:** Establish estimates/variances of effort, cost, establish initial plan
  - **Collaborate**: Set initial scope and expectations with stakeholders
  - **Automate**: Establish a collaborative development environment
- At each iteration, improve estimates and report
  - **Report**: Values and variances of progress achieved, quality achieved, resources expended
  - **Collaborate**: With stakeholders to refine scope and plans
  - **Automate**: Manage changes to plans, baselines, test-beds

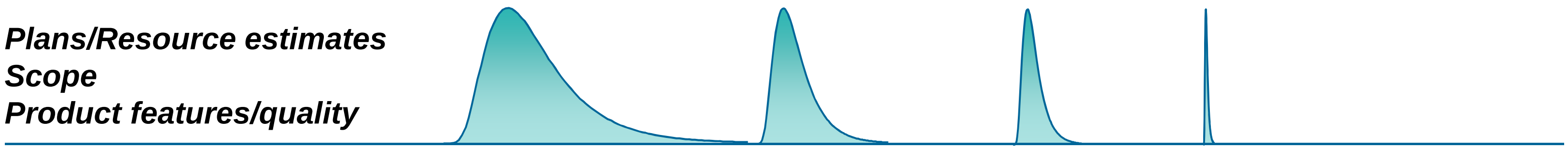

Initial Plan
Initial State
Initial Planned Path
Uncertainty in stakeholder satisfaction space
Variance in estimate to complete
Actual Path

Agile Governance = Managing Uncertainty = Managing Variance

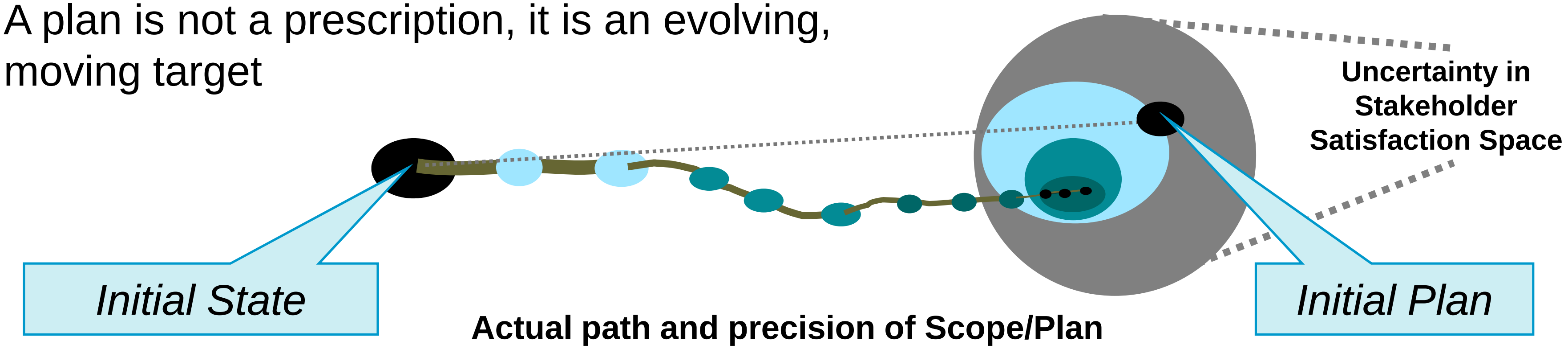
- A completion date is not a point in time, it is a probability distribution



- Scope is not a requirements document, it is a continuous negotiation



- A plan is not a prescription, it is an evolving, moving target


Uncertainty in Stakeholder Satisfaction Space
Initial State
Initial Plan
Actual path and precision of Scope/Plan

Four patterns of success in achieving Agility at Scale

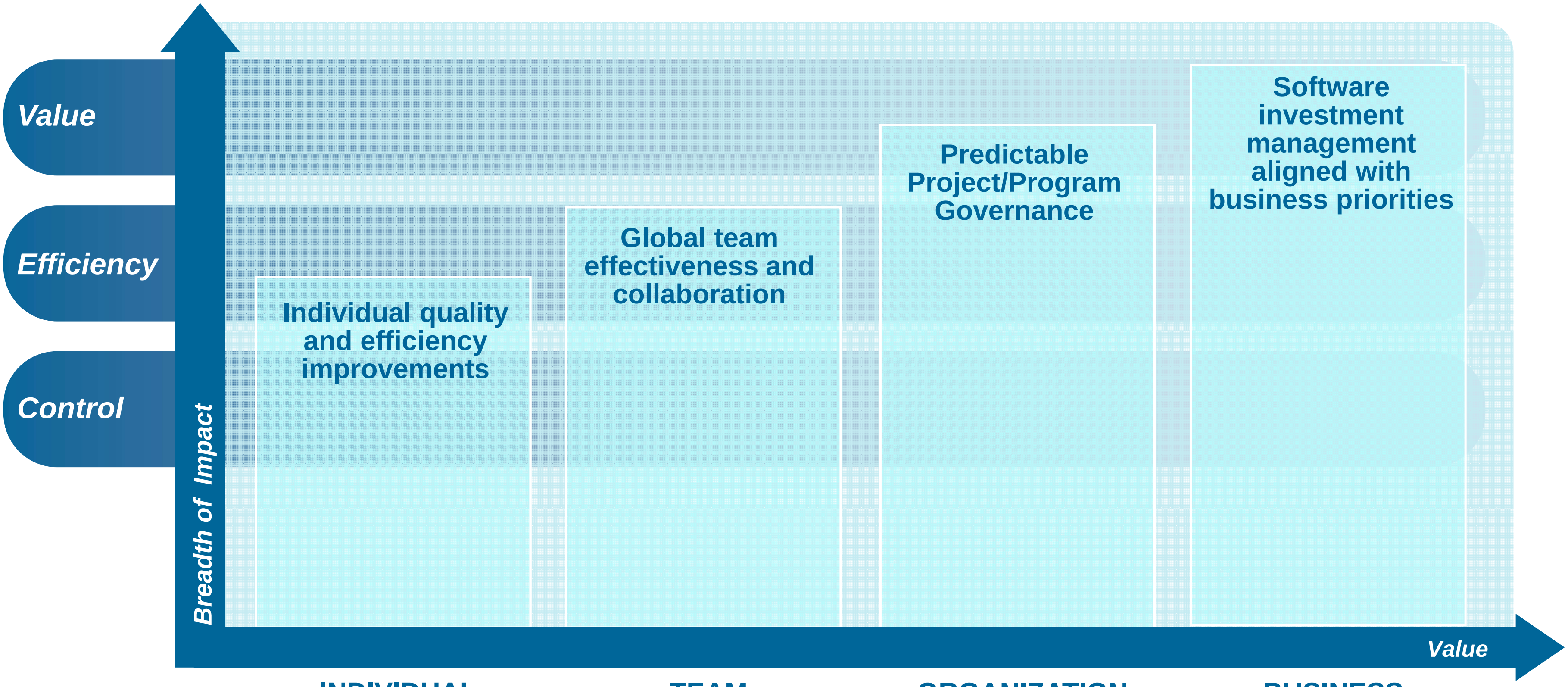
1. **Scope management ➔ *Asset based development***
   Solutions evolve from requirements AND requirements evolve from available assets
   As opposed to getting all the requirements right up front

2. **Process management ➔ *Rightsize the process***
   Process and instrumentation rigor evolves from light to heavy
   As opposed to the entire project's lifecycle process should be light or heavy depending on the character of the project

3. **Progress management ➔ *Honest assessments***
   Healthy projects display a sequence of progressions and digressions
   As opposed to progressing to 100% earned value with monotonically increasing progress against a static plan

4. **Quality management ➔ *Incremental demonstrable results***
   Testing needs to be a 1st class, full lifecycle activity
   As opposed to a subordinate, later lifecycle activity

Effective software delivery enabled by agility and measurement


Value
Efficiency
Control
Breadth of Impact
Individual quality and efficiency improvements
Global team effectiveness and collaboration
Predictable Project/Program Governance
Software investment management aligned with business priorities
Value

Measures of increasing value

INDIVIDUAL

- More creative time, less overhead time
- Painless governance
- More automation support

TEAM

- Fewer meetings
- Less scrap/rework
- Earlier defect detection
- Honest metrics

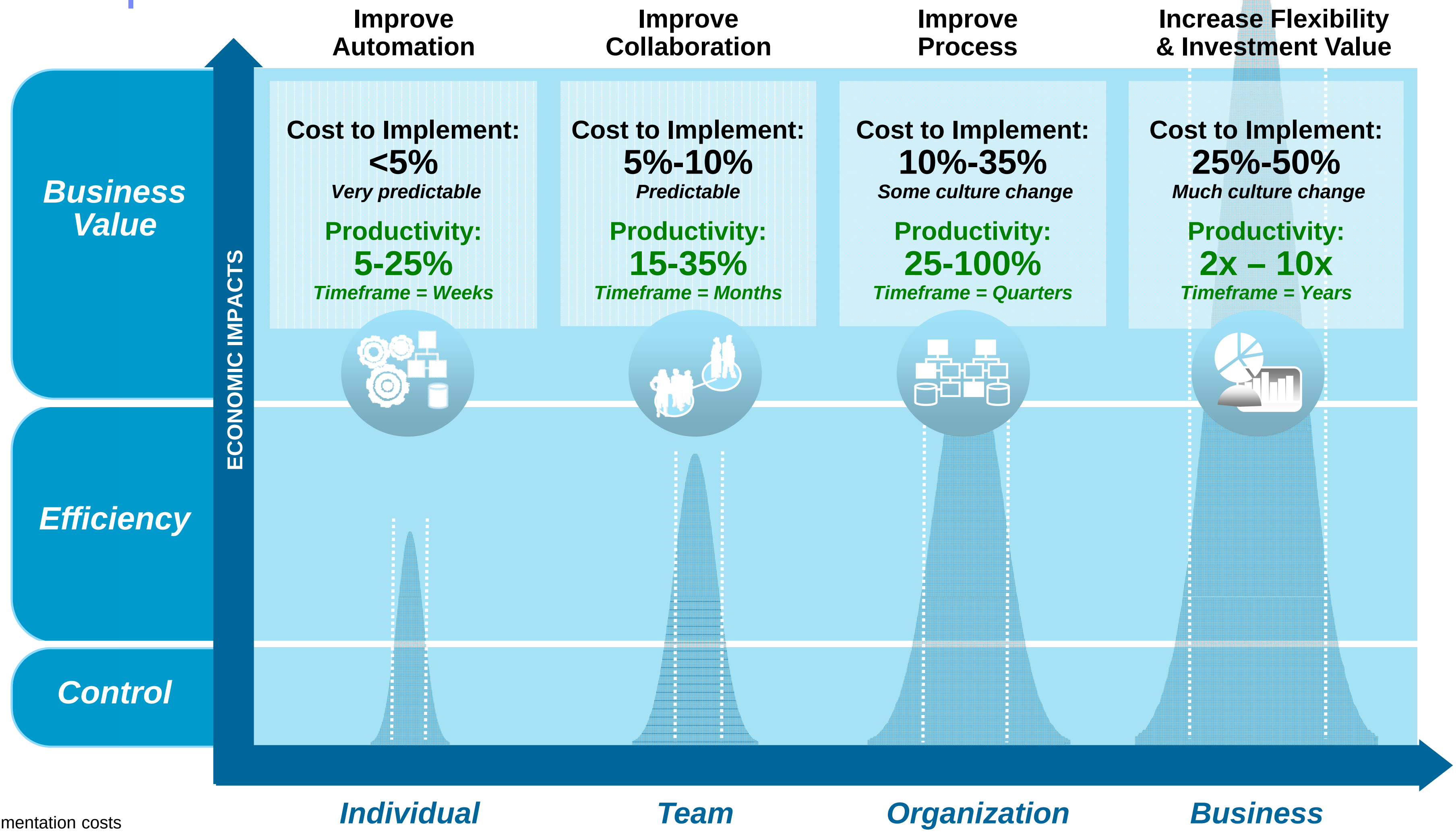
ORGANIZATION

- More reusable assets, services, skills, practices and measures
- More predictable outcomes
- Higher ROI

BUSINESS

- Optimized investments and supply chains
- Software development as an first class business process
- Business optimization

Invest across the spectrum of improvement to manage risks and optimize business outcomes



Improve Automation

Cost to Implement: **<5%** *Very predictable*

Productivity: **5-25%** *Timeframe = Weeks*

Improve Collaboration

Cost to Implement: **5%-10%** *Predictable*

Productivity: **15-35%** *Timeframe = Months*

Improve Process

Cost to Implement: **10%-35%** *Some culture change*

Productivity: **25-100%** *Timeframe = Quarters*

Increase Flexibility & Investment Value

Cost to Implement: **25%-50%** *Much culture change*

Productivity: **2x – 10x** *Timeframe = Years*

ECONOMIC IMPACTS

Business Value

Efficiency

Control

Individual ***Team*** ***Organization*** ***Business***

Implementation costs
are per person per year

Some final thoughts

Agile Software delivery is a discipline of software economics

Strong measurement practices are necessary to manage uncertainty and achieving agility at scale

Economic governance requires a platform that is architected for automation, collaboration and reporting